

MAKING SALTS

Making Soluble Salts

There are 3 types of reaction that can be used to make soluble salts. All 3 involve:

- An Acid
- A metal or metal compound

Method 1



e.g. *magnesium + hydrochloric acid* \longrightarrow *magnesium chloride + hydrogen*

Method 2



Method 3



Making salts

To form the name of a salt, you just combine the name of the metal involved, with the salt type associated with the acid.

Hydrochloric acid makes chlorides, Sulfuric makes sulfates, Nitric makes nitrates.

Complete the table as practice

	<i>Hydrochloric acid</i>	<i>Sulphuric acid</i>	<i>Nitric acid</i>
<i>Sodium hydroxide</i>	Sodium chloride + water		
<i>Potassium oxide</i>		Potassium sulfate + water	
<i>Calcium</i>			Calcium nitrate + water

Reactions of metals with acids

When a metal reacts with an acid it gives off hydrogen (which can be "popped" using a lit splint). The other product is a salt.



e.g. magnesium + hydrochloric acid \longrightarrow magnesium chloride + hydrogen

Copy and complete the following reactions:

1) Calcium + hydrochloric acid \longrightarrow

2) Zinc + hydrochloric acid \longrightarrow

3) Iron + hydrochloric acid \longrightarrow

4) Lithium + sulphuric acid \longrightarrow

Quiz on acids and alkalis

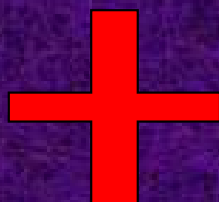
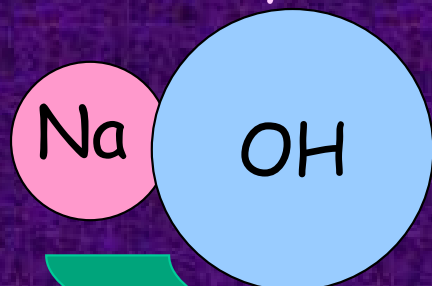
Acid, alkali or both???

- 1) This a pH of less than 7
- 2) This could kill cells
- 3) A metal hydroxide (e.g. sodium hydroxide) would be an _____
- 4) When this reacts with a metal hydrogen is released
- 5) A metal carbonate (e.g. calcium carbonate) would be an _____
- 6) This would feel soapy on your skin
- 7) This could be a corrosive
- 8) This will turn universal indicator purple
- 9) This would taste sour
- 10) This means "a base that can be dissolved"

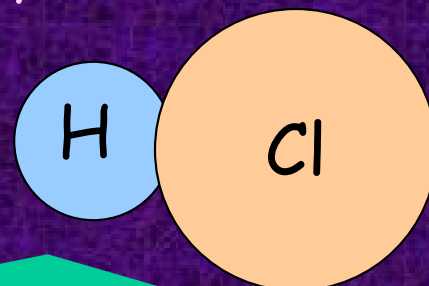
Neutralisation reactions

When acids and alkalis react together they will NEUTRALISE each other. Neutralisation is an example of a displacement reaction:

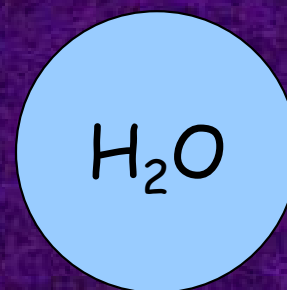
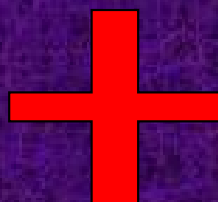
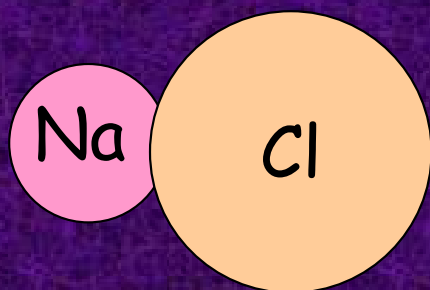
Sodium hydroxide



Hydrochloric acid



The sodium DISPLACES the hydrogen from HCl



Sodium chloride

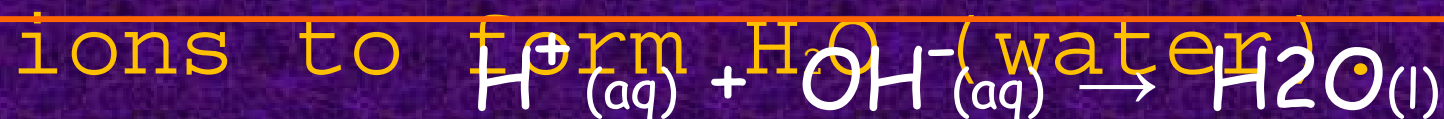
Water

H^+ ions and OH^- ions

- H^+ ions make acids acidic.
- OH^- ions make alkalis alkaline.
- The pH scale measures the



During neutralisation reactions
the H^+ ions react with the OH^-



Neutralisation experiment

Sodium hydroxide + hydrochloric acid → sodium chloride + water

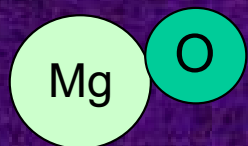
A _____ was formed during the reaction, and we could have separated this by _____ the solution, allowing the salt to Crystallise. The salt that we formed depended on the acid:

- Hydrochloric acid will make a CHLORIDE
- Nitric acid will make a _____
- Sulphuric acid will make a _____

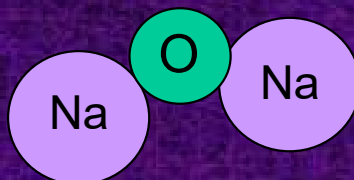
Words to use - nitrate, neutralised, alkali, sulphate, salt, evaporating

Reactions of metal oxides with acid

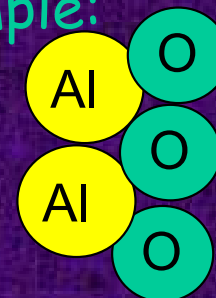
A metal oxide is a compound containing a metal and oxide. They are sometimes called BASES. A BASE is simply an insoluble alkali - it neutralises acids, but does not dissolve in water. For example:



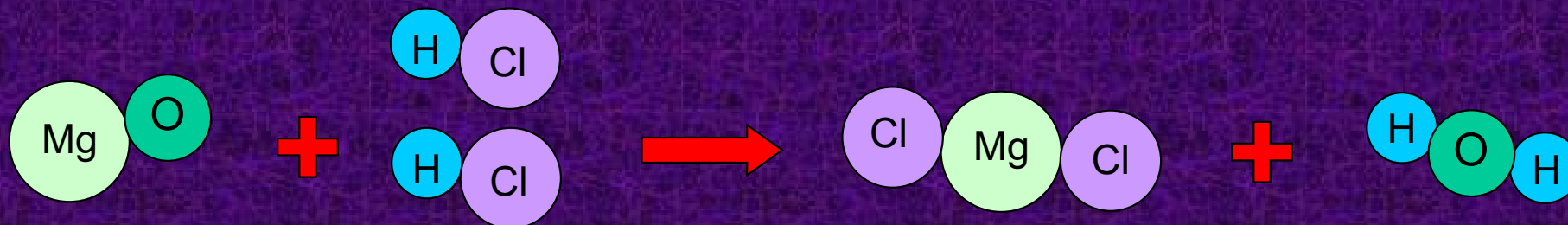
Magnesium oxide



Sodium oxide



Aluminium oxide



Copy and complete the following reactions:

1) Magnesium oxide + hydrochloric acid



2) Calcium oxide + hydrochloric acid



3) Sodium oxide + sulphuric acid



Using Bases to Make Salts

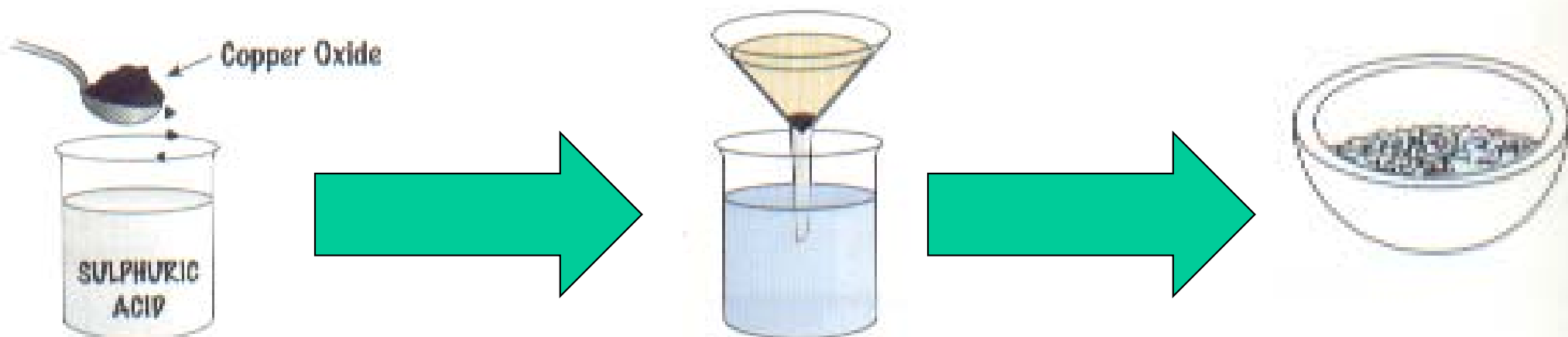
Because Bases are insoluble the procedure for making a salt is very slightly different...

...Instead of simply evaporating off the water, you have to first remove any remaining (or excess) Base by filtration.

1) Drop the base into the acid...

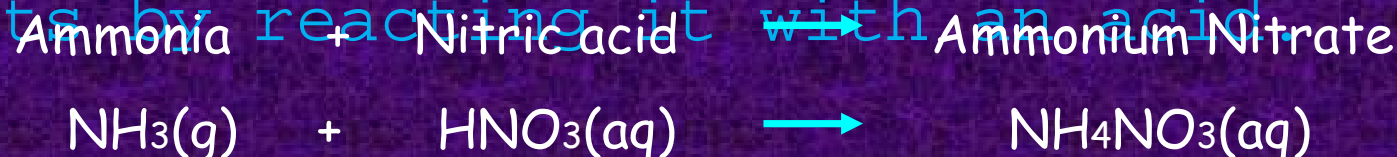
2) Filter it to remove any leftover base

3) Evaporate it to get the salt



Ammonium Salts

- Ammonia (NH_3) is a gas that dissolves in water to make an alkali (Ammonium hydroxide).
- This can then be used to make Ammonium salts by reacting it with an acid.



- Notice how NO water is made in this neutralisation reaction.
- Ammonium salts make good fertilisers because plants need nitrate to make proteins (to grow). Ammonium Nitrate is the best for this purpose. Can you see why??



Making Insoluble Salts

- Doesn't usually require an acid.
- Insoluble salts can be made by mixing appropriate solutions of ions (soluble salts) that form a precipitate.

Barium chloride + Sodium sulfate → Barium sulfate + Sodium chloride



Precipitation can be used to remove unwanted ions from solutions, for example in treating water for drinking or in treating effluent. - The filter is covered in ions, which form precipitates with ions in the water.



SENSE
This picture makes none

An example question on reactivity

Which metal is most reactive?

<i>Metal</i>	<i>Reaction with dilute acid</i>	<i>Reaction with water</i>	<i>Reaction with oxygen</i>
A	Some reaction	Slow reaction	Burns brightly
B	No reaction	No reaction	Reacts slowly
C	No reaction	No reaction	No reaction
D	Violent reaction	Slow reaction	Burns brightly
E	Reasonable reaction	Reacts with steam only	Reacts slowly